Claims

We claim:

1. A device, comprising:

a growth surface;

a growth mask on the growth surface, the growth mask defining an elongate growth window;

an optical waveguide core mesa located in the growth window and having a trapezoidal cross-sectional shape; and

a cladding layer covering the optical waveguide core mesa and extending over at least part of the growth mask.

2. The device of claim 1, in which:

the growth surface has a [100] crystalline orientation; and

the optical waveguide core mesa comprises sidewalls having a [111] crystalline orientation.

3. The device of claim 2, in which the growth mask comprises opposed edges aligned parallel to the [011] crystalline direction of the growth surface.

4. The device of claim 1, in which the optical waveguide core mesa is homogeneous in structure and has a greater refractive index than the cladding layer.

5. The device of claim 1, in which:

the device is an optoelectronic device; and

the optical waveguide core mesa comprises a quantum well structure.

6. The device of claim 5, in which the quantum well structure comprises quantum well layers comprising aluminum, gallium, indium and arsenic.

7. The device of claim 5, in which the quantum well structure comprises quantum well layers comprising gallium, indium, arsenic and phosphorus.

8. The device of claim 5, in which the optical waveguide core additionally comprises a separate confinement heterostructure in which the quantum well structure is located.

9. The device of claim 5, in which the optical waveguide core mesa comprises materials having a greater refractive index than the cladding layer.

10. The device of claim 1, in which:
the cladding layer is a first cladding layer;
the device additionally comprises a second cladding layer; and
the growth surface is a surface of the second cladding layer.

11. The device of claim 1, in which the growth mask and the optical waveguide core mesa are similar in thickness.

12. A device fabrication method, comprising:
providing a growth chamber;
providing a wafer comprising a growth surface; and
in the growth chamber, performing a fabrication process, comprising:
growing an optical waveguide core mesa on the growth surface by micro-selective area growth, and
without removing the wafer from the growth chamber after the fabricating, covering the optical waveguide core mesa with cladding material.

13. The method of claim 12, in which the growing comprises:
forming a growth mask on the growth surface, the growth mask defining an elongate growth window; and
growing the optical waveguide core mesa in the growth window by the micro-selective area growth.

14. The method of claim 13, in which:

the growth surface has a [100] crystalline orientation; and

the forming comprises aligning opposed edges of the growth mask parallel to the [011] crystalline direction of the growth surface.

15. The method of claim 13, in which the fabrication process lacks an etching process performed after completion of the forming and before completion of the covering.

16. The method of claim 12, in which:

the optical waveguide core mesa comprises sloped sidewalls and a top surface extending between the sidewalls;

the growing comprises growing the optical waveguide core mesa at a growth temperature above that at which adatoms migrate from the sidewalls to the top surface of the optical waveguide; and

the covering comprises growing the cladding material at a growth temperature below that at which adatoms migrate off the side walls of the optical waveguide core mesa.

17. The method of claim 16, in which the covering comprises growing the cladding material laterally over part of the growth mask.

18. The method of claim 12, in which the covering comprises growing the cladding material under growth conditions in which the cladding material grows on the sidewalls of the optical waveguide core mesa in addition to the top surface thereof.

19. A device fabrication method, comprising:

providing a wafer comprising a growth surface;

at a first growth temperature, growing an optical waveguide core mesa on the growth surface by micro-selective area growth, and

at a second growth temperature, lower than the first growth temperature, covering the optical waveguide core mesa with cladding material.

20. The method of claim 19, in which:

the optical waveguide core mesa comprises sidewalls having a width;

the first growth temperature is at a temperature at which adatoms have a surface diffusion length greater than the width of the sidewalls; and

the second growth temperature is at a temperature at which the adatoms have a surface diffusion length less than the width of the sidewalls.

21. The method of claim 19, additionally comprising growing a sublayer of the cladding material on the optical waveguide core mesa by micro-selective area growth.

22. The method of claim 21, in which growing the sublayer of the cladding material comprises setting the growth temperature to a temperature intermediate between the first growth temperature and the second growth temperature.